When the Paint's On, the Heat's Gone

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Playing sports such as soccer, baseball, or football on a hot and sunny day is always dreaded, especially when playing on synthetic turf. In August, turf temperatures in Madison, WI can be above 50°C, roughly 20°C hotter than grass. For players, the heat is especially prevalent in the feet and can cause health concerns such as, heatstroke and blisters, as well as physical concerns like melting shoes and harsher turf burns[1]. Ideas on replacing turf infill and shoe insoles have all been evaluated, but they are costly and not very effective. Instead we propose a low-cost strategy, targeting the heat before it enters the shoe. We hypothesize that applying a reflective layer to the bottom of the shoe will allow the heat to reflect off the shoe, allowing for more heat resistance compared to products currently on the market. After multiple experiments, the interior temperature of the reflective shoe demonstrated a notable 5.5°C decrease compared to control shoe after 90 minutes (the typical length of a professional soccer match). Whereas, the Blusol shoe (Blusol, the only commercially available insole for heat resistance) was only 2.6°C cooler than the control shoe. We conclude that the greater heat resistance of the reflective layer and its cost-effective nature provides a better option than the currently available insole.

Awards Won:
Air Force Research Laboratory on behalf of the United States Air Force: Glass trophy and USAF medal for each recipient
Air Force Research Laboratory on behalf of the United States Air Force: First Award of $750 in each Regeneron ISEF Category,